

WHAT IS CLAIMED IS:

1. Process for producing a surface layer with embedded intermetallic phases, the process comprising the acts of:
  - applying a layer comprising a metal and a ceramic to a substrate element,
  - causing a reaction to take place between the metal and the ceramic of the layer as a result of energy being introduced during the application of the layer or as a result of a subsequent introduction of energy, and
  - producing a resultant surface layer having intermetallic phases being formed.
2. Process according to Claim 1, wherein the metal of the layer is one of aluminium and an aluminium alloy.
3. Process according to Claim 1, wherein the ceramic of the layer is an oxide ceramic.
4. Process according to Claim 2, wherein the ceramic of the layer is an oxide ceramic.
5. Process according to Claim 1, wherein the layer is applied via one of a thermal spraying process, a slip technique, or a painting technique.

6. Process according to Claim 2, wherein the layer is applied via one of a thermal spraying process, a slip technique, or a painting technique.
7. Process according to Claim 3, wherein the layer is applied via one of a thermal spraying process, a slip technique, or a painting technique.
8. Process according to Claim 4, wherein the layer is applied via one of a thermal spraying process, a slip technique, or a painting technique.
9. Process according to Claim 1, wherein the energy is introduced via at least one of an infrared heating source, a laser, and an induction heat source.
10. Process according to Claim 2, wherein the energy is introduced via at least one of an infrared heating source, a laser, and an induction heat source.
11. Process according to Claim 3, wherein the energy is introduced via at least one of an infrared heating source, a laser, and an induction heat source.

12. Process according to Claim 4, wherein the energy is introduced via at least one of an infrared heating source, a laser, and an induction heat source.
13. Process according to Claim 5, wherein the energy is introduced via at least one of an infrared heating source, a laser, and an induction heat source.
14. Process according to Claim 6, wherein the energy is introduced via at least one of an infrared heating source, a laser, and an induction heat source.
15. Process according to Claim 7, wherein the energy is introduced via at least one of an infrared heating source, a laser, and an induction heat source.
16. Process according to Claim 8, wherein the energy is introduced via at least one of an infrared heating source, a laser, and an induction heat source.

17 A process for producing a surface layer with embedded inter-metallic phases, the process comprising:

- (a) applying a layer to a substrate, the layer comprising a metal and a ceramic;
- (b) introducing energy to react the metal and the ceramic such that a resulting surface layer is formed with inter-metallic phases.

18. The process of claim 17, wherein the energy is introduced simultaneously with the application of the layer.

19. The process of claim 17, wherein the energy is introduced subsequent to the application of the layer.

20. The process of Claim 17, wherein the metal is selected from the group consisting of aluminium and aluminium alloy.

21. The process of Claim 17, wherein the ceramic is an oxide ceramic.